

US EPA ARCHIVE DOCUMENT



STAR

Carbon Geosequestration

Projects Progress Review

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January 7, 2013

EPA & ORD Mission



Environmental Protection Agency Mission:

To protect human health & the environment.

Office of Research & Development Mission:

To conduct leading-edge research and foster the sound use of science and technology to fulfill EPA's mission to protect human health and the environment.



National Research Programs



- Homeland Security
- Air, Climate & Energy
- Safe & Sustainable Water Resource**
- Sustainable & Healthy Communities
- Human Health Risk Assessment
- Chemical Safety for Sustainability

NCER Mission & Goal



Mission of the National Center for Environmental Research:

To support **high**-quality research by funding the nation's leading scientists and engineers to improve EPA's scientific foundation for decisions.



Goal:

To compliment ORD's research agenda through extramural research to provide the scientific foundation for EPA's regulatory activities and decisions

NCER's Extramural Programs



- Science To Achieve Results (**STAR**)
 - Targeted Research Grants through Requests For Applications
 - Competed Centers
- Fellowship Programs
 - STAR Graduate
 - Greater Research Opportunities (GRO) Undergraduate
- Small Business Innovation Research (SBIR)
Contracts



NCER By The #s



- ✓ 180 Research grants awarded annually - 40 grants jointly with private sector partners
- ✓ Average of 120 fellowships (Grad and Undergrad) awarded annually to approximately 280 universities and nonprofit research institutions
- ✓ 600-750 active research grants, 300 fellowships and approximately 150 peer reviews managed annually by NCER staff of scientists and engineers



CO₂ Capture & Sequestration



CCS may greatly reduce CO₂ emissions from new & existing coal & gas fired power plants, industrial processes, and other stationary sources of CO₂.

- Immediate potential as climate change mitigation technology

As much as 3,600 billion tons of CO₂ could be stored underground in the United States and Canada alone

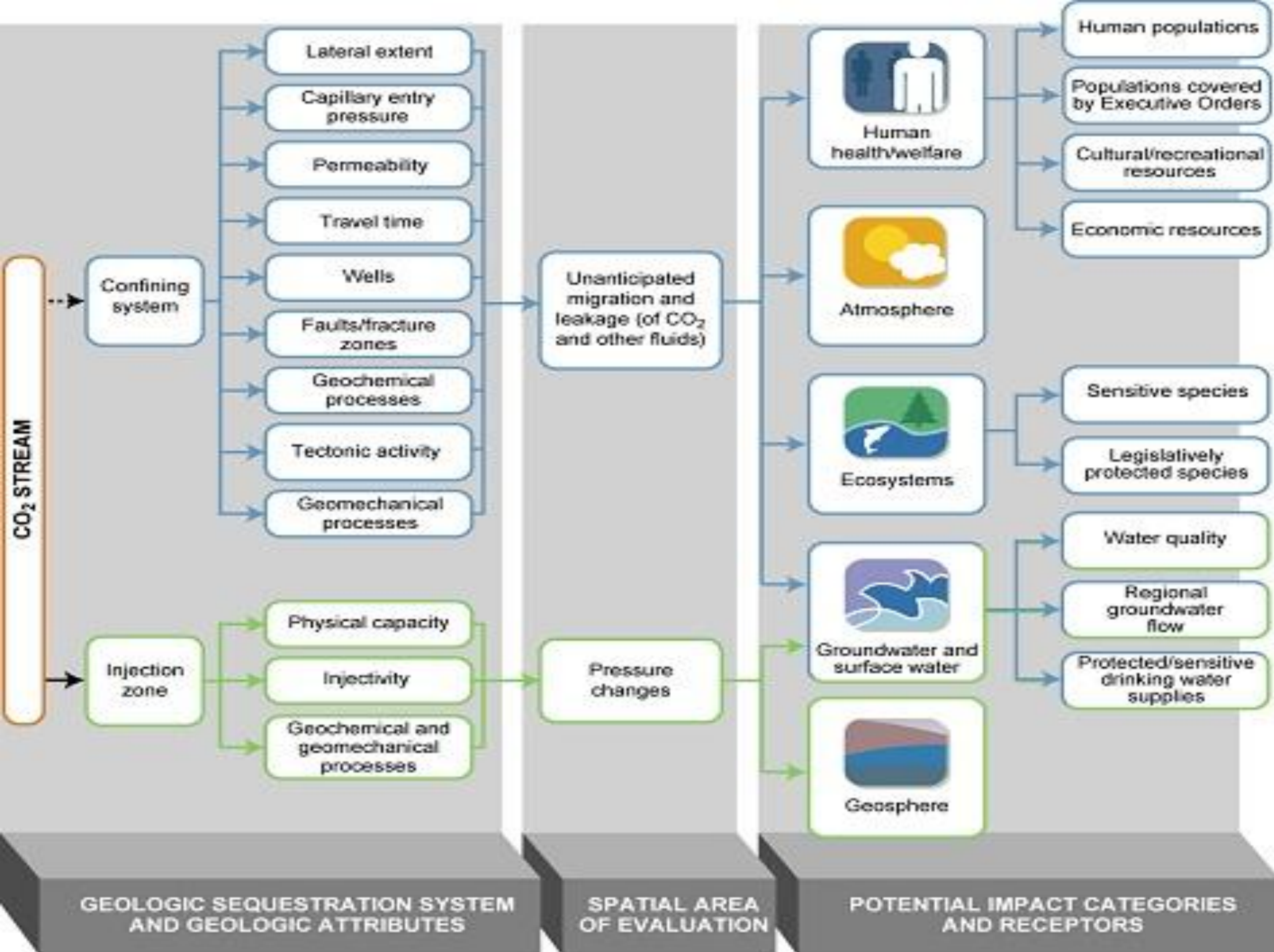
- Large stationary sources worldwide emit approximately 13 billion tons of CO₂ per year
- Key technology for achieving domestic GHG emission reductions

CO₂ Capture & Sequestration



Geologic sequestration is the 3rd step in CCS:

1. Capture of CO₂ from power plants or industrial sources
2. Transport of the captured and compressed CO₂ (usually in pipelines)
3. Underground injection and geologic sequestration, or permanent storage
 - Followed by monitoring to verify that the CO₂ remains permanently underground



CCS



Protecting Underground Sources of Drinking Water

New Class VI wells under the SDWA UIC Program

- To protect USDWs
- Requirements for appropriate siting, construction, testing, monitoring, funding, and closing.

Greenhouse Gas Reporting

Under the CAA, GHG reporting mechanisms for suppliers of CO₂, and underground injection and geologic sequestration of CO₂.

- To monitor the growth and effectiveness of CCS as a GHG mitigation technology over time and to evaluate relevant policy options.

Applicability under Hazardous Waste Laws.

- Being considered

CO₂ Sequestration Research



STAR RFA to support research on sound risk management strategies for the underground injection of anthropogenic carbon dioxide (CO₂) in subsurface geologic formations.

Reduce risks to sources of drinking water, and improved safeguards for protection of public health and the environment.

Capitalize on site characteristics to optimize storage and reduce risks



http://epa.gov/ncер/rfa/2008/2008_star_gsc02.html

GS STAR Grant Projects



- RA, Modeling, Field, Lab & in-situ work
- Work began late 2009
- Modeling efforts ground-truthed with field studies
- Highly leveraged with other efforts
- \$900K per project represents significant EPA commitment
- Groundwater protection ties in to multiple EPA priorities

GS STAR Grant Projects



Will Provide:

- Optimal engineering metrics needed to minimize site-specific risks
- Regional monitoring tools for decision-makers
- Web-based interactive modeling for probability-based risk assessments
- Parameters indicating suitability of geologic formations

GS STAR Grant Projects



- **U Illinois Urbana-Champaign (Roy, Mehnert, Benson); hydrodynamics of fluid flow, pressure monitoring for leak detection**
- **Clemson U (Falta, Benson); Exsolution of CO₂**
- **U. Texas Austin (Nicot, Hovorka); site-specific monitoring, drinking water suppliers' education**
- **Princeton (Celia, Nordbotten); probability-based risk assessment and hierarchical modeling framework, space-time pressure perturbations**
- **U. Utah (McPherson, Deo); Integrated engineering designs, modeling, monitoring of natural tracers (⁴He)**
- **Colorado School of Mines (McCray, Maxwell, Sichler); Geochemical reactions between CO₂, aquifer fluids, and minerals.**
- **Columbia U (Goldberg, Matter, O'Mullan, Slute, Takahashi); CO₂ leakage effects on microbiology and biogeochemistry**